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What I'm Reading (June 11)

By Chuck Dinerstein, MD, MBA — June 11, 2020

A walk on the thoughtful "wild side" of why old-school epidemiology has over-promised and under-delivered, discovering that population density is more than how tightly we are packed, an alternative hypothesis for how sleep refreshes our bodies and spirits, and an update on a maligned energy source, fusion.

Image courtesy of AkshayaPatra Foundation on Pixabay [1]

Epidemiology, the study of the spread of disease within a population, has vaulted into everyone's awareness over the past four months. There has been much ink spent on epidemiologic models, their predictions, their failures, how they protect us, or steal our liberties.

"Our existing mental models for things like epidemics are still shaped by the 1854 Broad Street cholera outbreak in London that was traced to the water from a single well. It turned out to be a very linear problem. John Snow, who founded the field of epidemiology, stopped the incidence of new cases by removing the pump handle.

21st-century problems, by contrast, are wickedly non-linear. They have many degrees of uncertainty that combine to produce catastrophically surprising effects. Global climate instability, financial market volatility, and the present pandemic are all examples of systems that are impossible to reason about in linear terms—there is no pump handle to remove."

From Dropbox of all places, Karl Friston takes on the pandemic with the brain's arsenal [2]

One of the constants in COVID-'s spread has been population density, the tighter we are packed in, the higher the chance of exposure. But the term itself, population density, contains within those number other risks, such as poverty or lack of access to care. It also contains more densely populated households.

"A Wall Street Journal analysis found that, across the country, the virus has spread more widely in places with the most crowded households, not necessarily places with the largest or densest populations. Remote, rural hamlets where extended families live under the same roof have turned deadlier than some of the densest blocks of Manhattan or Chicago, the analysis found. In both contexts, the virus has zeroed in on crowded homes, sometimes wiping out generations in a matter of days."

From WSJ, Covid-19 Stalks Large Families in Rural America [3]

Adequate sleep is one of the cornerstones of medical advice; after all, sleep refreshes us physically and mentally. That said, how sleep acts as the "pause that refreshes," remains hypothetical.

"We all know that we need sleep to be at our best. But profound sleep loss has more serious and immediate effects: Animals completely deprived of sleep die. Yet scientists have found it oddly hard to say exactly why sleep loss is lethal.

Sleep is primarily seen as a neurological phenomenon, and yet when deprived creatures die, they have a puzzlingly diverse set of failures in the body outside the nervous system. Insufficient sleep in humans and lab animals, if chronic, sets up health problems that surface over time, such as heart disease, high blood pressure, obesity, and diabetes. But those conditions are not what slays creatures that are 100% sleep deprived within days or weeks."

It turns out that the source of sleep insufficiency's lethal nature may not lie in the need for our brain to rest, but elsewhere, in the gut. From Quanta, Why Sleep Deprivation Kills [4]

Finally, let's consider the problem of energy. Yes, fossil fuels are harmful, if for no other reason than they are irreplaceable and limited. Renewables, the green powers of wind and water are useful to feel a gap but are not a complete replacement. And nuclear energy, between Chernobyl and Fukushima, is, forgive the humor, too radioactive for mainstream discussion, except perhaps in France. What if we could remove or significantly mitigate nuclear's toxicity, is it time to invest in fusion?

“Solar and wind power are environmental darlings, but expanding them significantly will require vast new infrastructure to make their clean electricity available when and where it is needed. “Relying solely on solar and wind is a fool’s hope, I think,” Binderbauer says. Several recent studies, including a major technical analysis in the journal Proceedings of the National Academy of Sciences, back up his assessment: We simply do not know how to build an electric grid that can handle the inconsistent way that the sun shines and the wind blows. Even if renewables come to generate the majority of our electricity, they need to be combined with so-called dispatchable power that can be switched on at any time.

All those considerations, taken together, imply that we need something completely new in the global energy mix. Binderbauer argues that the most realistic something is fusion.”

From Nautil.us, The Road Less Traveled to Fusion Energy [5]
